

Response to ET Docket No. 02-15

Public Comment on Spectrum Policy Task Force
on issues related to FCC Spectrum Policies.

From:

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Background:

I have had a 30-year career in electromagnetic science and engineering. My research is in radio-astronomy and my teaching is electromagnetic engineering. I have served on the Committee on Radio Frequencies of the National Academy of Sciences. I fully recognize the tremendous potential from new spectrum uses and also the attendant pressures on the spectrum. I appreciate the opportunity for input to the FCC, as it considers the general principles underlying its present policies.

General Comments:

The FCC has followed a set of policies suited to its charge for many years, with standard procedures for public comment and review as new rules are proposed. It is critical that any specific proposal for changes to these policies and procedures should be published and made available for public comment with sufficient time for all interested parties to respond. Decisions to change the fundamentals of FCC policies should be taken with a broad view of the National good, not subject to pressure for change from any one sector of the users of the EM spectrum.

Market Oriented Allocation and Assignment Policies:

Whereas most spectrum use is for communication involving engineering control over both transmission and reception, passive users of the spectrum can only control their receivers. Radio astronomy relies almost exclusively on passive techniques, to detect the extremely weak signals from atoms and molecules in stars, galaxies and the intervening near-vacuum of space. However, such activities do not have an obvious value in a market for spectrum usage. There is of course a very great value in radio astronomy at the more fundamental level of exploration of our environment and our place in the Universe. This value is reflected in the large federal budget support for the radio astronomical facilities funded by NSF, NASA and various private funding agencies. There are also indirect values in the advances in radio engineering made by astronomers, such as the early development of low noise techniques, which

are now widely available in the microwave range.

The present rules allocate spectrum resources for astronomy and remote sensing of the earth's atmosphere in spite of the absence of any associated tax-base or income generation (ie no market value). If market-based criteria are to be introduced for spectrum management, it is essential that these same passive uses be recognized as having value to the Nation. Such procedures should be designed so that the protection currently assigned to passive services is maintained. Any changes in allocation should be subject to at least the same level of review as in the current procedures.

Interference Protection:

Evidently this is the area of most concern to radio astronomy. The protected astronomy bands are increasingly subject to contamination by "out-of-band" transmissions of other users. These include unwanted harmonics, and spread-spectrum techniques that are not properly filtered. These are particularly troublesome when transmitted earthward by aircraft or spacecraft. Mitigation techniques are being researched by radio astronomers, but any new FCC procedures must include safeguards that do not worsen the interference in the allocated bands. Whereas the very low levels of the astronomical signals make us especially prone to interference, all users suffer as the unwanted contamination as wide-band transmissions increase. Any new unlicensed allocations must at least meet existing standards.

As computer clock speeds increase it is essential for all users that unwanted transmission from computers be held to the current FCC rules. Consideration could be given to requiring limits on emissions toward particular sensitive receiving locations. Astronomers should be flexible in considering interference limits that are time, position and direction specific.

Public Safety Communications:

"...how best to preserve and protect the ability of public safety, public service and critical infrastructure entities to do their important jobs...". The enormous federal investments in radio astronomical facilities should be included under public service entities. The National Radio Quiet Zone around the Green Bank (WVa) radio telescope is an example of a successful technique for such preservation. Similar protection is needed for the Arecibo Observatory (PR) and the Very Large Array (NM).

International Issues:

The EM spectrum is a global resource. It is clear that radio-astronomy is an international science as recognized by the various entities involved in international spectrum management (eg ITU). It is also clear that many commercial communication uses are international. As an example of the global

nature of the problem, the out-of-band transmissions from GLONAS satellite system causes serious disruptions of US and international radio astronomy. It is essential that any changes in FCC policies and procedures be done in such a way that international interests be respected. Thus international consultation must be part of any plan for revision of FCC procedures.